Please provide the following information, and submit to the NOAA DM Plan Repository.

Reference to Master DM Plan (if applicable)

As stated in Section IV, Requirement 1.3, DM Plans may be hierarchical. If this DM Plan inherits provisions from a higher-level DM Plan already submitted to the Repository, then this more-specific Plan only needs to provide information that differs from what was provided in the Master DM Plan.

URL of higher-level DM Plan (if any) as submitted to DM Plan Repository:

1. General Description of Data to be Managed

1.1. Name of the Data, data collection Project, or data-producing Program:

MD/PA Sandy Supplemental Lidar - Classified LAS 1.2

1.2. Summary description of the data:

MD/PA Sandy Supplemental Lidar Data Acquisition and Processing Production Task USGS

Contract No. G10PC00057

Task Order No. G14PD00397

Woolpert Order No. 74333

CONTRACTOR: Woolpert, Inc.

This task is for a high resolution data set of lidar covering approximately 1,845 square miles. The lidar data was acquired and processed under the requirements identified in this task order. Lidar data is a remotely sensed high resolution elevation data collected by an airborne platform. The lidar sensor uses a combination of laser range finding, GPS positioning, and inertial measurement technologies. The lidar systems collect data point clouds that are used to produce highly detailed Digital Elevation Models (DEMs) of the earth's terrain, man-made structures, and vegetation. The task required the LiDAR data to be collected at a nominal pulse spacing (NPS) of 0.7 meters. The final products include classified LAS, one (1) meter pixel raster DEMs of the bare-earth surface in ERDAS IMG Format, and 8-bit intensity images. Each LAS file contains lidar point information, which has been calibrated, controlled, and classified. Additional deliverables include hydrologic breakline data, control data, tile index, lidar processing and survey reports in PDF format, FGDC metadata files for each data deliverable in .xml format, and LAS swath data. Ground conditions: Water at normal levels; no unusual inundation; no snow; leaf off. Coastal tiles 18SVH065720 and 8SVH095690 contain no lidar points as they exist completely in water. A DEM IMG was generated for these two tiles as the digitized hydro breakline assumed the data extent in the area. As such only 2568 LAS and Intensity files will be delivered along with 2570 DEM IMG's.

1.3. Is this a one-time data collection, or an ongoing series of measurements?

One-time data collection

1.4. Actual or planned temporal coverage of the data:
2014-12-07, 2014-12-15, 2014-12-17, 2014-12-18, 2014-12-19, 2014-12-20, 2014-12-21, 2014-12-26, 2014-12-27, 2014-12-29, 2014-12-30, 2014-12-31, 2015-01-02

1.5. Actual or planned geographic coverage of the data:
W: -76.347352, E: -75.755154, N: 39.3835, S: 38.578482

1.6. Type(s) of data:
(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)
Lidar point cloud

1.7. Data collection method(s):
(e.g., satellite, airplane, unmanned aerial system, radar, weather station, moored buoy, research vessel, autonomous underwater vehicle, animal tagging, manual surveys, enforcement activities, numerical model, etc.)

1.8. If data are from a NOAA Observing System of Record, indicate name of system:

1.8.1. If data are from another observing system, please specify:

2. Point of Contact for this Data Management Plan (author or maintainer)

2.1. Name:
NOAA Office for Coastal Management (NOAA/OCM)

2.2. Title:
Metadata Contact

2.3. Affiliation or facility:
NOAA Office for Coastal Management (NOAA/OCM)

2.4. E-mail address:
coastal.info@noaa.gov

2.5. Phone number:
(843) 740-1202

3. Responsible Party for Data Management
Program Managers, or their designee, shall be responsible for assuring the proper management of the data produced by their Program. Please indicate the responsible party below.

3.1. Name:

3.2. Title:
Data Steward

4. Resources

Programs must identify resources within their own budget for managing the data they produce.

4.1. Have resources for management of these data been identified?

Yes

4.2. Approximate percentage of the budget for these data devoted to data management (specify percentage or "unknown"):

Unknown

5. Data Lineage and Quality

NOAA has issued Information Quality Guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information which it disseminates.

5.1. Processing workflow of the data from collection or acquisition to making it publicly accessible

(describe or provide URL of description):

Process Steps:

- 2014-12-07 00:00:00 - Using two Leica ALS70 (lidar) systems on board a Cessna 310 and Cessna 404 aircraft respectively, high density data, at a nominal pulse spacing (NPS) of 0.7 meters, were collected for this task order (approximately 1,813 square miles). Leica Specs - For Kent & Talbot (MD): AGL = 1,981 meters - Aircraft Speed = 150 Knots, Field of View (Full) = 40 degrees, Pulse Rate = 272 kHz, Scan Rate = 41.5 Hz, with an average side lap of 25%. Multiple returns were recorded for each laser pulse along with an intensity value for each return. For Carroll & Baltimore (MD), Chester (PA): AGL = 2,286 meters - Aircraft Speed = 150 Knots, Field of View (Full) = 32 degrees, Pulse Rate = 239 kHz, Scan Rate = 40 Hz, with an average side lap of 25%. Multiple returns were recorded for each laser pulse along with an intensity value for each return.Seventeen (17) missions were flown between December 7, 2014 and January 2, 2015. Five (5) Global Navigation Satellite System (GNSS) Base Stations were used in support of the lidar data acquisition. Specific information regarding latitude, longitude, and ellipsoid height to the L1 phase center is included in the lidar processing report. The geoid used to reduce satellite derived elevations to orthometric heights was GEOID12A. Data for the task order is referenced to the UTM Zone 18N, North American Datum of 1983 (2011), and NAVD88, in meters. Once the data acquisition and GPS processing phases are complete, the lidar data was processed immediately to verify the coverage had no voids. The GPS and IMU data was post processed using differential and Kalman filter algorithms to derive a best estimate of trajectory. The quality of the solution was verified to be consistent with the accuracy requirements of the project. The SBET was used to reduce the lidar slant range measurements to a raw reflective surface for each flight line. The coverage was classified to extract a bare earth digital elevation model (DEM) and separate last returns. The ALS70 calibration and system performance is verified on a periodic basis using Woolpert's calibration range. The calibration range consists of a large building and runway. The edges of the building and control points along

the runway have been located using conventional survey methods. Inertial measurement unit (IMU) misalignment angles and horizontal accuracy are calculated by comparing the position of the building edges between opposing flight lines. The scanner scale factor and vertical accuracy is calculated through comparison of lidar data against control points along the runway. Field calibration is performed on all flight lines to refine the IMU misalignment angles. IMU misalignment angles are calculated from the relative displacement of features within the overlap region of adjacent (and opposing) flight lines. The raw lidar data is reduced using the refined misalignment angles.
- 2015-01-14 00:00:00 - The field crews utilized VRS RTK GPS by logging into the KeyNet RTK GPS Network to obtain real time corrections of the collected GPS data. This is a technique used in land surveying based on the use of carrier phase measurements of the GPS and GLONASS signals where a network calculated reference station provides the real-time corrections, providing up to centimeter-level accuracy. This methodology allowed for efficient survey grade observations for sensor calibrations and ground-truthing. Woolpert Woolpert, Inc. Sandy Supplemental March 2015 MD / PA QL2 Lidar USGS/NGTOC Section 1: Page 3 of 3 utilized a single Trimble Navigation R8 dual-frequency geodetic GPS receiver at the rover end of the vector for this task. The survey was conducted using a 1-second epoch rate, in a fixed solution RTK mode with each GPS session lasting 120 epochs to 180 epochs
- 2014-12-08 00:00:00 - The individual flight lines were inspected to ensure the systematic and residual errors have been identified and removed. Then, the flight lines were compared to adjacent flight lines for any mismatches to obtain a homogenous coverage throughout the project area. The point cloud underwent a classification process to determine bare-earth points and non-ground points utilizing "first and only" as well as "last of many" lidar returns. This process determined Default (Class 1), Ground (Class 2), Noise (Class 7), Water (Class 9), Ignored Ground (Class 10), Overlap Default (Class 17) and Overlap Ground (Class 18). The bare-earth (Class 2 - Ground) lidar points underwent a manual QA/QC step to verify the quality of the DEM as well as a peer-based QC review. This included a review of the DEM surface to remove artifacts and ensure topographic quality. Classification of water (class 9) and ignored ground (class 10) was completed via the use of the hydrologic breaklines collected for the hydro-flattening phase. The overlap classes were determined by first identifying the overlapping areas and reclassifying the LAS data by offset from a corridor. This allows the returns located on the edge of the swath to be removed from the bare earth coverage in an effort to produce a more uniform data density. The returns determined to be overlap including overlap default, ground, water, and ignored ground are then applied an overlap flag and reclassified to their respective standard classification value.. The surveyed ground control points are used to make vertical adjustments to the data set and to perform the accuracy checks and statistical analysis of the lidar dataset. Supervisory QC monitoring of work in progress and completed editing ensured consistency of classification character and adherence to project requirements

across the entire project area. The resulting deliverables for this task order consist of classified LAS file in LAS 1.2 format, Raw Swath LAS files in LAS 1.2 format, 1 meter pixel size DEM files in ERDAS IMG format, 1 meter pixel size 8-bit Intensity files in GeoTIFF format, and Hydrologic Breakline data in ESRI shape file format. - 2018-03-06 00:00:00 - Point cloud data were downloaded from Maryland iMAP in LAZ format, UTM 18, NAVD88 (Geoid12a) meters in October 2017. Data were reprojected to geographic coordinates and reduced to ellipsoid heights. Data were then ingested into the Digital Coast Data Access Viewer.

5.1.1. If data at different stages of the workflow, or products derived from these data, are subject to a separate data management plan, provide reference to other plan:

5.2. Quality control procedures employed (describe or provide URL of description):

6. Data Documentation

The EDMC Data Documentation Procedural Directive requires that NOAA data be well documented, specifies the use of ISO 19115 and related standards for documentation of new data, and provides links to resources and tools for metadata creation and validation.

6.1. Does metadata comply with EDMC Data Documentation directive?

No

6.1.1. If metadata are non-existent or non-compliant, please explain:

Missing/invalid information:
- 1.7. Data collection method(s)
- 3.1. Responsible Party for Data Management
- 5.2. Quality control procedures employed
- 7.4. Approximate delay between data collection and dissemination
- 8.3. Approximate delay between data collection and submission to an archive facility
- 8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?

6.2. Name of organization or facility providing metadata hosting:

NMFS Office of Science and Technology

6.2.1. If service is needed for metadata hosting, please indicate:

6.3. URL of metadata folder or data catalog, if known:

https://www.fisheries.noaa.gov/inport/item/51863

6.4. Process for producing and maintaining metadata

(describe or provide URL of description):

Metadata produced and maintained in accordance with the NOAA Data Documentation

Procedural Directive: https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC_PD-Data_Documentation_v1.pdf

7. Data Access

NAO 212-15 states that access to environmental data may only be restricted when distribution is explicitly limited by law, regulation, policy (such as those applicable to personally identifiable information or protected critical infrastructure information or proprietary trade information) or by security requirements. The EDMC Data Access Procedural Directive contains specific guidance, recommends the use of open-standard, interoperable, non-proprietary web services, provides information about resources and tools to enable data access, and includes a Waiver to be submitted to justify any approach other than full, unrestricted public access.

7.1. Do these data comply with the Data Access directive?

Yes

7.1.1. If the data are not to be made available to the public at all, or with limitations, has a Waiver (Appendix A of Data Access directive) been filed?

7.1.2. If there are limitations to public data access, describe how data are protected from unauthorized access or disclosure:

7.2. Name of organization of facility providing data access:

NOAA Office for Coastal Management (NOAA/OCM)

7.2.1. If data hosting service is needed, please indicate:

7.2.2. URL of data access service, if known:

https://coast.noaa.gov/dataviewer/#/lidar/search/where:ID=8488
https://coast.noaa.gov/htdata/lidar2_z/geoid18/data/8488

7.3. Data access methods or services offered:

Data is available online for custom downloads

7.4. Approximate delay between data collection and dissemination:

7.4.1. If delay is longer than latency of automated processing, indicate under what authority data access is delayed:

8. Data Preservation and Protection

The NOAA Procedure for Scientific Records Appraisal and Archive Approval describes how to identify, appraise and decide what scientific records are to be preserved in a NOAA archive.

8.1. Actual or planned long-term data archive location:

(Specify NCEI-MD, NCEI-CO, NCEI-NC, NCEI-MS, World Data Center (WDC) facility, Other, To

Be Determined, Unable to Archive, or No Archiving Intended)
NCEI_CO

8.1.1. If World Data Center or Other, specify:

8.1.2. If To Be Determined, Unable to Archive or No Archiving Intended, explain:

8.2. Data storage facility prior to being sent to an archive facility (if any):
Office for Coastal Management - Charleston, SC

8.3. Approximate delay between data collection and submission to an archive facility:

8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?
Discuss data back-up, disaster recovery/contingency planning, and off-site data storage relevant to the data collection

9. Additional Line Office or Staff Office Questions
Line and Staff Offices may extend this template by inserting additional questions in this section.